

A Comprehensive Exploration of Topical Dosage Form in Ayurveda: A Review

Nidhi Shah^{1*}, Anuja Rana¹, Dr. Shuchi Mitra², Dr. Usha Sharma², Dr. Khem Chand Sharma³

¹PG Scholar, P.G Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, India. 249401

²Associate Professor, P.G Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, India. 249401

³Professor & Head of Department, P.G Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, India. 249401

DOI: [10.36348/sijtc.2024.v07i02.001](https://doi.org/10.36348/sijtc.2024.v07i02.001)

| Received: 18.12.2023 | Accepted: 29.01.2024 | Published: 01.02.2024

*Corresponding author: Nidhi Shah

PG Scholar, P.G Department of Rasa Shastra & Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, India. 249401

Abstract

In order to effectively deliver drug molecules to their intended targets in the body, different dosage forms are utilized. Adapting dosage forms to the specific needs of the modern era and the condition of the disease can enhance the provision of healthcare to those in need, particularly through the use of herbal and traditional (Unani and Ayurvedic) products. Ayurveda employs various classifications of dosage forms, such as Aushadha kalpana and Ahara kalpana. Aushadha kalpana can be further categorized into Primary kalpana (Panchavidha kashaya Kalpana) and Secondary kalpana. These classifications are based on the origin of the ingredients, including plant, animal, and mineral sources. Dosage forms can also be classified based on their physical state, such as liquid, semi-solid, and solid forms. Furthermore, dosage forms can be categorized according to their intended usage, including Bahya kalpana (external application) and Abhyantara kalpana (internal administration). The importance of employing various dosage forms in Ayurveda lies in making them compatible and palatable to patients, as well as increasing their shelf life. One significant classification within Ayurveda is the topical dosage form (Bahya Kalpana), which encompasses formulations like lepa Kalpana, Malhara Kalpana, and Upnaha Kalpana. This article focuses specifically on exploring the topical dosage forms in Ayurveda.

Keywords: Dosage form, Lepa Kalpana, Cream, Ointment.

Copyright © 2024 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

A drug may be defined as an agent, intended for use in the diagnosis, mitigation, treatment, cure or prevention of disease in man or in other animals [1]. To ensure effective administration, drugs are formulated into different dosage forms. Ayurveda mentions various Kalpanas (dosage forms) that aim to extract active principles using different mediums like water, oil, and ghee. These Ayurvedic dosage forms are tailored based on patient convenience and age categories. They play a crucial role in the internal and external therapeutic use for patients. The formulation of these Kalpanas aims to increase potency, enhance palatability, and incorporate modern technology [2]. Based on usage, they are classified into two types: Bahya kalpana (external use) and Abhyantara kalpana (internal use). Bahya Kalpana refers to medicines intended for external application on the body surface, such as the skin or mucous membranes.

Different forms of external applications, such as lepa, Upanaha, and Malahara kalpana, are described for the treatment of various diseases, providing convenience and targeted action at the affected site. External application offers advantages such as direct application for quick action, easy removal in case of irritation, accessibility in terms of application, avoidance of first-pass metabolism, and convenience of use [3].

Lepa Kalpana

Lepa preparation are the topical medicaments meant for external application to the skin or mucosal membrane. They are used in different conditions like inflammation, wound healing, wound cleaning and has many more uses. In Lepa Kalpana different herbal drug in the form of powder is taken and is triturated with different media to form paste and applied externally as Lepa [4].

Details of Lepa Kalpana

Types of Lepa Kalpana According to Sushruta [5]	Pralepa - It is applied in a thin form and may be applied where Pidana Karma is not necessary. This type of Lepa possesses cooling property (Shita Guna). It is indicated in Rakta and Pitta Pradhana Shotha.
According to Sharangdhar [6]	Pradeha- It is thick or thin, warm or cold based on the involvement of Dosha and shouldn't be dried completely. It is used in Vata and Shleshma Pradhana Shotha.
According to DravyaGuna Vigyan [7]	Alepa- It possesses the quality of both Pralepa and Pradeha. The action, thickness etc. of this Lepa will be moderate. It is useful in Rakta and Pitta Dosha Pradhana skin diseases. Doshaghna- This variety of Lepa includes such drugs which exerts their alleviatory action directly on the aggravated Doshas. Vishaghana- This kind of Lepa includes the drugs which nullify the poisons directly at the local area after application. The drugs used in this Lepa are more potent than those in Doshaghna Lepa Varnayakar- It is a cosmetic application over the face, which improves color & complexion.
Thickness of Lepa	Pralepa Pradeha
Time of Lepa application	One-fourth, one third & half Anguli are the thickness of the Lepa respectively for Doshaghna, Vishaghna & Varnya Lepa. (Sharangdhar Samhita.) (One Angula is approximately equal to 1.95 cm.) So Doshaghna, Vishaghna and Varnya Lepa's thickness should be 0.48 cm, 0.65 cm, and 0.97 cm respectively [8]. Acharya Sushruta opines the thickness of <i>Lepa</i> application on the skin should be equal to the thickness of the buffalo's skin [9]. Acharya Charaka has stated that when a rubefacient action of a drug is expected, it should be applied thick & uniformly over the skin. However, when softening & soothing effects is to be elicited, the drug should be applied uniformly thin over the skin [10].
Shelf life	<i>Alepa</i> should not be applied at night nor be allowed to stay after it dries up. The heat of the body comes out through the skin pores at night normally, if medicinal applications are applied at night, the skin pores get blocked & obstruct the transfer of body heat. That is why the topical applications shouldn't be applied at night [6].
	Rule 161-B of Drugs and Cosmetics Rule, 1945 says that the shelf life period of <i>Lepa Churna</i> is 1 year, <i>Lepa Malahara</i> is 2 years, and <i>Lepa Gutti</i> is 3 years [1]. The Gazette of India mentions the Shelf life for <i>Lepa</i> as 3 years.

Technique of Lepa Application

Lepa should be gently rubbed in an upward or reverse direction of the hairs over the skin to make the action of application more quick and effective.

Due to this, the drug enters into the pores at the root of the hair through which the drug gets absorbed in the capillary network to minor veins and then further into systemic blood circulation. This results in the absorption of medicament and desired effects. This method of rubbing increases the skin temperature, which might be speeding up the pilosebaceous uptake and skin permeation of the drug as heat causes dilation of the capillary end [11].

Probable mode of action of Lepa

Lepas should be applied against the hair follicular direction, this facilitates the quicker absorption of the drugs through Romakupa (Hair roots), Swedavahini (sweat glands) and Siramukha (blood capillaries) [8]. In the chapter titled "Dhamani vyakaranasadhyaya," Sushruta provides detailed explanations about the Dhamanis, which are divided into

categories known as Urdhwagata, Adhogata, and Tiryakgata. In this context, he delves into the intricacies of four Tiryakgani siras. Among these four, each progressively branches out into hundreds and thousands of smaller divisions, forming an extensive, uncountable network that encompasses and connects with the body. These intricate networks have a close relationship with hair follicles, serving as channels for sweat transport and the replenishment of rasa. As a result, they facilitate the circulation of the Veerya of Abhyanga within and around the body, effectively enveloping it. Snana and Lepa Dravyas enter the body after being transformed into skin; the same also carry pleasant touch sensation [12]. Bhrajaka Pitta is responsible for the metabolic processing of substances applied to the skin, and one of its primary roles is to influence the color and complexion of the skin (Twak). In the process of metabolism, the coordinated actions of Samanvayu, supported by Vyana Vayu, play a crucial role. Ayurveda also introduces the concept of the 'Strotomaya Purush,' suggesting that the entire human body is permeable. When medication is applied in the form of a Lepa or Pradeha (ointments or pastes), the tiny particles of the substance penetrate the

skin due to the influence of gravity and the weight of the drug. The Upashoshana property of Vayu (Vyana and Samana especially) would play a major role in the penetration, and absorption of the medicaments applied over the Twak. After being absorbed in the Twak, the drugs would act upon the body, pertaining to its virya (active principle) and in some cases according to its Prabhava [13].

Malhara Kalpana

A formulation which cleanses the feculence or debris from site of action is called as Malahara [14]. The term 'Malahara' is being used by the text Yogaratnakara for the first time. Before that, term 'Abhyanjana' was used in classical texts for semi solid topical formulations. In the twentieth century, a Rasashastra treatise viz. Rasatarangini enumerated number of Malahara. This dosage form is developed from its primitive dosage forms so as to improve its efficacy, application and shelf life [15]. Malahara has a property like snehana (oelation), cleansing, ropana (healing), lekhana (scaraping), and varnya (beautifying), depending on the drugs used in the preparation [16].

Probable mode of action of Malahara

Malahara Kalpana is intended for its penetration through the skin for its therapeutic action. Even in case of Varnya Action of few Malahara, permeable base material is required which will help to balance Udan Vayu. Applied Malahara undergoes Pachana by Bhrajak Pitta. Thereafter, Udan Vayu facilitates penetration of that Malahara from outer surface of the skin to the Sira. For understanding of systemic absorption through skin, rachana sharir from sushruta is needed to be explored. Sushruta described Tiryakgami Sira are four in number and further divided into small branches, these small branches of Sira are beneath the skin. Essential elements from Abyanga, Parisheka, Avagaha, Lapan after metabolized by Bhrajaka Pitta are transported from applied site to the desired organ system by these branches of Tiryakgami Sira [17].

Shelf life of Malahara Kalpana: 3 years according to D&C Act.

Upanaha Kalpana

Upanaha is derived from the two syllables "Upa"+ "Nah" where "Upa" is an Upasarga (Prefix) meaning "Near" and "Nah" Bandhane means to tie or Bind. The function of Upanaha is to bandage or to bandage with medicaments. So the procedure whereby warm medicinal herbal paste is applied locally to the affected parts of the body, followed by bandaging, is referred to as Upanaha Swedana. For the utmost benefit, the applied Upanaha should be kept at the local site, undisturbed for at least a period of twelve hours before being removed [18].

Types of Upanaha

Acharya Chakrapani [19], has stated that there are two types of Upanaha:

1. Sagni Upanaha (the medicinal herbal paste is heated and then applied)
2. Niragni Upanaha (medicinal herbal paste has hot potency and used without heating)

Acharya Dalhana [20], stated that there are three types of Upanaha:

1. Pradeha Upanaha (a thick paste of medicaments are applied to the affected part).
2. Sankar Upanaha (the paste is made into a bolus and wrapped in a cloth).
3. Bandhan Upanaha [21], (the medicaments are used on the affected part and then firmly tied with a thin piece of cloth or leaves with Vatahara properties)

Other types of Upanaha Include

1. Salavana Upanaha [22]. (Saindhava Lavana is used for Swedana either alone or along with other medicinal drugs).
2. Snigdha & Ruksha Upanaha (Drugs having Snigdha & Ruksha qualities are used respectively, along with other medicinal drugs). Acharya Charaka has considered Upanaha as a type of Niragni Swedana since it does not involve direct heat.

Procedure of Upanaha [16]

Patient should be allowed to be in comfortable position exposing the joint or body part to be tied with upanaha dravya. Part is cleaned and abhyanga should be done locally with lukewarm oil (if indicated). Prepared upanaha dravyas should be pasted on affected part thickly and uniformly about 1-2cm thickness and covered with vatahar patras (after slight heating). Tied with bandage cloth (not mandatory). After procedure-removal-part washed with lukewarm water.

Probable mode of action of Upanaha

The lipoidal bond (glycerol+fatty acids) is suitable for penetration of drug molecule through stratum corneum. On this basis, it can be assumed that in Upanaha, oil helps in the formation of lipoidal bond with other drugs thus helps in the penetration of drug molecules. Upanaha is a type of Swedana, so it induces hyperthermia which improves local blood and lymphatic circulation and thereby improving local tissue metabolism. It reduces inflammation by modifying secretion of various inflammatory mediators, relaxes local musculature by physical effect of heat, increases the rate of transdermal drug delivery and thereby reduces pain [23].

Avchurnan

It means pounding, grinding, reducing to powder, sprinkling with powder (the practical Sanskrit-Eng Dictionary) A homogenous medicated powder, It may passed through 120 no. sieve. It is used as an antiseptic, antipruritic, absorbent, protective etc [24]. In Ashtang Hridya it is mentioned in healing of wound. For healing of vrana (ulcers), which are, with firm muscles and localised in the skin, powders (of healing drugs) are desirable, powder of bark of kakubha, udumbara alvattha, jambu, katphala and rodhra avacûrnam is to be dusted into the vrana (ulcers) on the skin cures them quickly [25].

Topical Dosage Form of Ayurveda in Present Era

1. CREAM

Creams are semisolid dosage forms containing one or more drug substances dissolved or dispersed in a suitable base. This term has traditionally been applied to semisolids that possess a relatively fluid consistency formulated as either water-in-oil (e.g., Cold Cream) or oil-in water (e.g., Fluocinolone Acetonide Cream) emulsions [26]. These are used for cosmetic purposes such as cleansing, beautifying, improving appearances, protective or for therapeutic function. These topical formulations are used for the localized effect for the delivery of the drug into the underlying layer of the skin or the mucous membrane. These products are designed to be used topically for the better site specific delivery of the drug into the skin for skin disorders [27, 28].

2. OINTMENT

Ointments are semisolid preparations for external application to skin or mucous membranes. Their composition softens but does not melt upon application to the skin. Therapeutically, ointments function as skin protectives and emollients, but they are used primarily as vehicles for the topical application of drug substances [29]. They may be oleaginous e.g., white ointment; they may be entirely free of oleaginous substances e.g., polyethylene glycol ointment, or they may be emulsions of fatty or wax like material containing relatively high proportion of water e.g., hydrophilic ointment [30].

3. GEL

Gels are semi solid homogenous preparation used to cure and treat topical diseases. Gels are more hydrophilic in nature so the rate of released drug or active ingredient was fast. A gel consist of two component, three dimensional cross linked material which contain proportionally large amount of liquid medium to form adequate rigid network which immobilized the liquid continuous phase [31].

4. SERUM

Serum is a concentrated product which is swidely used in Cosmetology. The name comes from itself in professional cosmetology. The cosmetic serum is as concentrated in water or oil as any other cream Serum, or other concentrated product that contains ten

times more organic matter than cream [32]. Skin serum is a skin care product that you can apply to your skin after cleansing but before moisturizing with the intention of bringing the ingredients directly to the skin. Serum is particularly well suited for this task because it is made up of a small molecule that can penetrate deep into the skin and bring about a very high concentration of active ingredients [33].

5. DUSTING POWDER

Dusting powders are usually mixtures of two or more substances in fine powder, intended for external application on to the skin (wounds, burns, surgical incision). Powder bases absorb secretions and exert a drying effect, which relieves congestion and imparts a cooling sensation. Bentonite, kaolin, kieselguhr, magnesium carbonate, starch and talc are used as inert bases for dusting powders. These are dispensed in sifter-top packages. They have particle size about 0.1 micrometer to 10 micrometers. Dusting powders are used to prevent and treat minor skin infections caused by small cuts, scrapes, or burns. Some skin infections can also be treated by using dusting powders such as athlete's foot, jock itch, and ringworm [34]. Athlete's foot, jock itch and ringworm.

6. LINIMENT

According to Howard C. Ansel, liniments are alcoholic or oleaginous solutions or emulsions of various medicinal substances intended to be rubbed on the skin with friction. Liniments are used for various therapeutic effects depending on the ingredients they contain [35]. They are rubbed onto the affected area and, because of this, were once called embrocations. These are usually applied with friction and rubbing of the skin, the oil or soap base providing for ease of application and massage. Alcoholic liniments are used generally for their rubefacient, counterirritant, mildly astringent and penetrating effects. Such liniments penetrate the skin more readily than do those with an oil base. The oily liniments, therefore, are milder in their action but are more useful when massage is required. Depending on their ingredients, such liniments may function solely as protective coatings. Liniments should not be applied to skin that is bruised or broken [36].

7. POULTICE

A poultice is an ancient form of topical medication also known as a cataplasma. It is a soft mass of vegetable constituents or clay, usually heated before application. Kaolin poultice BP is prepared by mixing and heating dried, heavy kaolin and boric acid with glycerine. After cooling, the aromatic substances are incorporated with stirring. The product is spread on a dressing and applied hot to the skin [37]. Poultice should hold heat for a significant time frame since they are expected to supply warmth to aroused pieces of body [38].

Evaluation Parameters	
Cream [28]	Determination of pH Physical appearance Spreadability Saponification value Acid value Viscosity Homogeneity Removal Dye test Type of smear Irritancy study Accelerated stability study
Ointment [39]	Test of rate of absorption Test of non irritancy Test of rate of penetration Test of rate of drug release Test of rheological properties Test of content uniformity Test of preservative efficacy
Gel [40]	Homogeneity Grittiness Extrudability study pH Determination Viscosity Skin irritation study Drug content Spreadability In-vitro release
Serum [41]	Physical evaluation pH value Spreadability Microbial examination of product Stability study Cyclical temperature test
Dusting Powder [42]	Physical Characteristics pH Particle size Abrasiveness Bulk density & Tap density Carr's index Moisture content

DISCUSSION

The human body's largest organ, the skin, serves as the body's primary line of defence against pathogens and other objects. A drug must be present at the site of action in the proper concentration in order to have the desired effect. The medication concentration at the site of action relies on the dose that will be given. Therefore, choosing the right dose form is a need for effectively treating any disease or achieving the desired outcome.

For the distribution of different dosage forms, three crucial modes, including topical, regional, and transdermal, are frequently used. The topical dose forms are favoured among these delivery methods because they

offer local therapeutic activity when applied to the skin or mucous membranes.

Lepa, Malhara, Upnaha, Avchuran, etc. are examples of topical ayurvedic dose formulations. They have great significance in therapeutics as well as in cosmetic field also. They are simple and convenient to use, have an accessible application method, and are appropriate for self-medication. These dosage forms most likely work by allowing the drug to enter the pores at the hair's root, where it is subsequently absorbed through the capillary network to minor veins and ultimately into the systemic blood circulation. The medication is absorbed as a result, producing the desired benefits. The development of topical dose forms

including cream, ointment, and liniment offers various benefits.

CONCLUSION

Topical dosage forms play a significant role in Ayurvedic medicine, offering a versatile approach to address various health conditions. Lepa, Malahara, and Avchurana are among the commonly used forms, prepared through specific methods to extract and enhance the therapeutic properties of herbs. These formulations provide numerous benefits, including skin health, pain relief, wound healing, and stress reduction. The topical dose forms used in ayurveda and their development in the present day are covered in this article. There is vast scope of further advancement in this area.

REFERENCES

1. Malik, V. Law Relating to Drugs and Cosmetics, EBC Publishing, 27 Edition, S.3,
2. Arun, N., Vinay, K. R., & BASavaraj, G. Y. (2014). Various dosage forms of Ayurveda. *Unique J Ayu Herb Medicines*, 2(4), 20-3.
3. Mishra, A., Panola, R., Vyas, B., Marothia, D., & Kansara, H. (2014). Topical antibiotics and semisolid dosage forms. *Int. J. Pharm. Erud*, 4, 33-54.
4. Patil, P. A., Wagh, R. G., & Budhwat, P. P. (2018). Lepa Kalpana-A Review. *Journal of Ayurveda and Integrated Medical Sciences*, 3(05), 151-2.
5. Shastri, A. (2011). Sushruta Samhita. Chaukhambha Sanskrit sansthan, Part-1, Sutrasthan.
6. Shrivastava, S. (2017). Sharangdhara Samhita, Chaukhambha Orientalia, Madhyama Khanda. 2017
7. Sharma, P.V. (2020). Dravyaguna vigyan Part 2. Chaukhambha Bharti Academy. 2020.
8. Agrawal, R., & Gavali, J. (2020). A CRITICAL REVIEW ON LEPA KALPANA IN SKIN DISORDERS WSR TO SHARANGDHAR SAMHITA.
9. Chaudhari, T. G., Sneha, K., Mukund, D., & Pallavi, J. (2017). Role of Lepakalpana for improving Beauty of Skin wsr to Mukhalepa. *International Journal of Ayurveda and Pharma Research*, 5(5), 72-77.
10. Agrawal, R., & Gavali, J. (2020). A CRITICAL REVIEW ON LEPA KALPANA IN SKIN DISORDERS WSR TO SHARANGDHAR SAMHITA.
11. Patil, S. (2015). Topical dosages forms (Lepa Kalpana) of Ayurveda: An unexplored treasure. *International Journal of Green Pharmacy (IJGP)*, 9(4).
12. Chaudhari, T. G., Sneha, K., Mukund, D., & Pallavi, J. (2017). Role of Lepakalpana for improving Beauty of Skin wsr to Mukhalepa. *International Journal of Ayurveda and Pharma Research*, 5(5), 72-77.
13. Dhamankar, P. V. (1964). Ayurvediya Aushadhikaran (Agama ani Pratyaksha) 2ed. Mumbai: Shri Dhootpapeshwar Ayurved Vidyalaya Samiti, 1964.
14. Londhe, A., Patil, Y. Critical Review Of Malahara-A Topical Dosage Form.
15. Agnihotra, A. B. (2003). editor, Bhaisajya Kalpana Vijnana, 1st edn, Varanasi: Chaukamba Bharati Academy, 316.
16. Kumar, T., Sanapeti, R. V., & Prasad, B. S. (2019). Evaluation of effect of poultice (Upanaha Sweda) in low back pain (Katigraha): A randomized comparative clinical trial. *Ayu*, 40(3), 159.
17. Prof Radheyshyam, S., Dr. Gopesh, M., Dr. Gunjan, G. Ayurvediya Panchakarma Chikitsa Vigyan, 2nd Edition, Jaipur, Jagdish Sanskrit Pustakalaya, 109.
18. Acharya Pavhena Trivikramatmejena Yadav, Susruta Samhita, Reprint 2012, Varanasi, Chaukhambha Sanskrit Sansthan, Sutra Sthana, 18/04, 85.
19. Ibid, Chikitsa Sthana, 32/12, p.513.
20. Prof Ajay, K. S. Kayachikitsa Text Book (part4), 1st Edition, Delhi, Chaukhambha Orientalia Publications Chapter 3, 83.
21. Ibid, p 84.
22. Narine, A., Yadav, M., & Mangal, G. A Conceptual Study Of Upanaha Swedana.
23. Reddy, C., & Rama, K. (2018). Bhaishajya kalapna vijanam. Chaukhambha Bharti Academy. 2018
24. Gupta, A. (2006). Astanga Hridaya, Chaukhambha Prakashan, Sutrasthan. 2006
25. Sahu, T., Patel, T., Sahu, S., & Gidwani, B. (2016). Skin cream as topical drug delivery system: a review. *Journal of Pharmaceutical and Biological Sciences*, 4(5), 149.
26. Rai, P., Poudyal, A. P., & Das, S. (2019). Pharmaceutical Creams and their use in wound healing: A Review. *Journal of Drug Delivery and Therapeutics*, 9(3-s), 907-912.
27. [Http://dx.doi.org/10.22270/jddt.v9i3-s.3042](http://dx.doi.org/10.22270/jddt.v9i3-s.3042)
28. Chauhan, L., & Gupta, S. (2020). Creams: A review on classification, preparation methods, evaluation and its applications. *Journal of drug delivery and therapeutics*, 10(5-s), 281-289.
29. Maqbool, A., Mishra, M. K., Pathak, S., Kesharwani, A., & Kesharwani, A. (2017). Semisolid dosage forms manufacturing: Tools, critical process parameters, strategies, optimization, and recent advances. *Ind. Am. J. Pharm. Res*, 7, 882-893.
30. Samundre, P., Dangi, S., Patidar, T., & Shende, S. M. A REVIEW ON TOPICAL GEL. *International Journal of Creative Res. Thoughts*, 3951-54.
31. Rajdev, S. P., Gaikwad, S. D., Somvanshi, S., & Gunjal, S. (2022). formulation and evaluation of face serum, 2(5).
32. Amnuait, T., Khakhong, S., & Khongkow, P. (2019). Formulation development and facial skin evaluation of serum containing jellose from tamarind seeds. *Journal of Pharmaceutical Research International*, 31(4), 1-14.
33. Jain, N. K., & Gupta, G. D. (2008). Modern dispensing pharmacy. Pharma Book Syndicate; 2008.

34. Mittal, B. M. (1997). A Textbook of Pharmaceutical Formulation, Vallabh Prakashan. New Delhi, 236-47.
35. Abuan, R. G., Cruz, J. P., & Colet, P. C. (2014). EVALUATION OF THE ANTI-INFLAMMATORY ACTIVITY OF THE LINIMENT FROM THE LEAF EXTRACT OF VITEXNEGUNDO FAMILY VERBENACEAE. *European scientific journal*, 10(33).
36. Kahelakar, S. A. A practical approach to ayurvedic manufacturing (Missing).
37. Maqbool, A., Mishra, M. K., Pathak, S., Kesharwani, A., & Kesharwani, A. (2017). Semisolid dosage forms manufacturing: Tools, critical process parameters, strategies, optimization, and recent advances. *Ind. Am. J. Pharm. Res*, 7, 882-893.
38. Varshosaz, J., Sadrai, H., & Heidari, A. (2006). Nasal delivery of insulin using bioadhesive chitosan gels. *Drug delivery*, 13(1), 31-38.
39. Kaushal, D. Upadhyaya N. REVIEW ON OINTMENT.
40. Sharma, M. U., Arjariya, S., Chouksey, R., & Sharma, N. (2022). A Review: Formulation and Evaluation of Pharmaceutical Gel. *Journal of Pharmaceutical Negative Results*, 1344-1362.
41. Ojha, S., Chadha, H., & Aggarwal, B. (2019). Formulation and Evaluation Of Face Serum Containing Bee. *World J Pharm Res*, 8, 1100-5.
42. Sheikh, F. A., & Baheti, M. G. (2020). Formulation and Evaluation of Anti microbial Dusting Powder. *International Journal of Pharmacy & Life Sciences*, 11(7).